CLAIMS

I claim:

1. A light-emitting diode chip having an epitaxial semiconductor layer sequence with an active zone that emits electromagnetic radiation and an electrical contact structure comprising a radiation-transmissive electrical current expansion layer, which contains ZnO, and an electrical connection layer,

wherein

the current expansion layer comprises a window, in which the connection layer is applied on a cladding layer of the semiconductor layer sequence;

the connection layer is electrically conductively connected to the current expansion layer; and

the junction between the connection layer and the cladding layer, during the operation of the light-emitting diode chip, is not electrically conductive or is only so poorly electrically conductive that the entire, or virtually the entire, current flows via the current expansion layer into the semiconductor layer sequence.

2. The light-emitting diode chip according to claim 1,

wherein

the connection layer comprises a metal and the junction between the connection layer and the cladding layer comprises an electrical potential barrier.

3. The light-emitting diode chip according to claim 1,

wherein

the sheet resistance of intermediate layers of the semiconductor layer sequence between the active zone and the electrical contact structure is in each case greater than or equal to 200 Ω/sq.

4. The light-emitting diode chip according to claim 1,

wherein

the current expansion layer comprises a sheet resistance of less than or equal to 190 Ω/sq, preferably of less than or equal to 30 Ω/sq.

5. The light-emitting diode chip according to claim 1,

wherein

the connection layer extends beyond the window on that side of the current expansion layer which is remote from the semiconductor layer sequence and is applied to the front-side surface of the current expansion layer in such a way that it partly covers the latter and that the junction between the connection layer and the current expansion layer is electrically conductive in this region.

6. The light-emitting diode chip according to claim 1,

wherein

the semiconductor layer sequence is based on $In_xGa_yAl_{1-x-y}P$, $In_xGa_yAl_{1-x-y}As$, $In_xGa_yAl_{1-x-y}N$ or $In_xGa_yAs_{1-x-y}P$, where $0 \leq x \leq 1$, $0 \leq y \leq 1$ and $x + y \leq 1$.

7. The light-emitting diode chip according to claim 1,

wherein

the cladding layer comprises $Al_xGa_{1-x}As_yP_{1-y}$, where $0 \leq x \leq 1$, and $0 \leq y \leq 1$, preferably where $0.1 \leq x \leq 0.5$ and $y = 1$ or where $x = 0$ and $y = 0$.

8. The light-emitting diode chip according to claim 7,

wherein

the cladding layer is p-doped, with the dopant Zn and/or C.

9. The light-emitting diode chip according to claim 1,

wherein

the cladding layer is doped with a dopant concentration of between about $5 \cdot 10^{17}$ and about $5 \cdot 10^{19}$, in particular between about $1 \cdot 10^{18}$ and about $1 \cdot 10^{19}$, the limits being included in each case.

10. The light-emitting diode chip according to claim 1, wherein the current expansion layer comprises Al.

11. The light-emitting diode chip according to claim 10, wherein the proportion of Al in the current expansion layer lies between 0% and 10% inclusive, preferably between 1% inclusive and 3% inclusive.

12. The light-emitting diode chip according to claim 1, wherein the current expansion layer has a thickness of between 100 and 600 nm, in particular between 450 and 550 nm, the limits being included in each case.

13. The light-emitting diode chip according to claim 1, wherein the current expansion layer has a thickness corresponding to about a quarter of the wavelength of a radiation emitted by the light-emitting diode chip.

14. The light-emitting diode chip according to claim 1,

wherein

the current expansion layer is provided with watertight material in such a way that it is adequately protected against moisture.

15. The optoelectronic component according to claim 14,

wherein

watertight material is applied to free areas of the contact layer.

16. The optoelectronic component according to claim 15,

wherein

watertight material is applied to all the free areas of the contact layer.

17. The light-emitting diode chip according to claim 14,

wherein

the watertight material is a dielectric that is transparent to an electromagnetic radiation emitted by the light-emitting diode chip.

18. The light-emitting diode chip according to claim 17,

wherein

the dielectric comprises one or more of the substances Si_xN_y, SiO, SiO_2, Al_2O_3 and SiO_xN_y.

19. The light-emitting diode chip according to claim 14,

wherein

the refractive index of the watertight material is less than the refractive index of the current expansion layer and is adapted to the greatest possible extent in particular for a minimization of reflections of the radiation emitted by the light-emitting diode chip at interfaces with respect to the watertight material.

20. The light-emitting diode chip according to claim 14,

wherein

the current expansion layer has a thickness corresponding to about an integer multiple of half the wavelength of a radiation emitted by the light-emitting diode chip, and the watertight material has a thickness corresponding to about a quarter of said wavelength.

21. The light-emitting diode chip according to claim 14,

wherein

the thickness of the watertight material lies between 50 inclusive and 200 nm inclusive.